

Investigation

2

Linear Equations and Inequalities

Connecting geometry and algebra can help you solve problems. In the last Investigation, you used algebra to describe and reason about geometric shapes in the coordinate plane. Now, you will use coordinate geometry to help you think about algebraic equations and inequalities.

Suppose the managers of a shopping center want to upgrade their security system. Two providers bid for the job.

- Super Locks will charge \$3,975 to install the equipment and then \$6.00 per day to monitor the system and respond to alerts.
- Fail Safe will charge \$995 to install the equipment and then \$17.95 per day to monitor the system and respond to alerts.

Both companies are reliable and capable, so the choice comes down to cost.



Getting Ready for Problem 2.1

- What kinds of equations will show how the costs for the two companies are a function of the number of days?
- What patterns do you expect to see in graphs of the equations?
- How can you use a graph to answer questions about which company offers the best price?

2.1 Graphs of Linear Systems

The cost of the security services from Super Locks and Fail Safe depends on the number of days the company provides service. The graph below shows the bids for both companies.



Problem 2.1 Graphs of Linear Systems

- A.** Use the graphs to estimate the answers to these questions. Explain your reasoning in each case.
1. For what number of days will the costs for the two companies be the same? What is that cost?
 2. For what numbers of days will Super Locks cost less than Fail Safe?
 3. For what numbers of days will Super Locks cost less than \$6,000?
 4. What is the cost of one year of service from Fail Safe?
 5. How can Fail Safe adjust its per-day charge to make its cost for 500 days of service cheaper than Super Locks' cost?
- B.** For each company, write an equation for the cost c for d days of security services.
- C.** For parts (1) and (4) of Question A, write an equation you can solve to answer the question. Then use symbolic methods to find the exact answers.

ACE Homework starts on page 30.